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THE FURCATUS GROUP OF WESTERN NORTH AMERICAN
FLIES OF THE GENUS *CHRYSOPS* (DIPTERA :
TABANIDAE).¹

By CORNELIUS B. PHILIP.

For a number of years the writer has been dissatisfied with the available treatments for identification of certain western species of yellowish bodied *Chrysops* resembling superficially *C. furcatus* Walk., namely, *C. lupus* Whit., *C. coloradensis* Big., *C. proclivis*, O. S., and *C. surdus* O. S. Specimens heretofore determined as *C. lupus* represent one of the more abundant western Montana species of deerflies, and experimental use of this form demands exact knowledge of the taxonomic status of related species.

In his 1904 analysis of these species, the late Professor Hine considered the above species as distinct, but subsequent accumulation of materials has allowed further analysis with the indication of needed changes. Of interest, also, are additional records of distribution, many of which are not included in Kröber's (1926) monograph of the genus in North America. Parenthetically, it may be mentioned that a number of discrepancies in distributional data have been found in his article, e. g., *pikei* in Montana, *vittatus* in Washington and *noctifer* in North Carolina (p. 349); that work, as a source of new records, should therefore be carefully checked.

The "group" is admittedly a heterogeneous one, having superficial resemblance in the pattern seen on the abdomen, wing, or eyes in life, together with infuscation of cheeks and parts of the face in all but *coloradensis* and in an undescribed species here included. From a tinctorial point of view, *C. facialis* Town. shows closer resemblance to these species than to those having enlarged antennal joints like it. There are several species in the East showing head characters and eye patterns similar to those of this group.

Chrysops furcatus, Walk.

1848, List 1, 199, from Hudson Bay and Albany River. Osten Sacken, 1875,

¹Contribution from the Rocky Mountain Laboratory, United States Public Health Service, Hamilton, Montana.

Prodrome 1, 391 (questions synonymy with *C. striatus* O. S.). Ricardo, 1901, Am. Mag. Nat. Hist. Ser. 7, VIII, 302 (separates from *striatus*). Hine, 1904, Ohio Nat. 5 : 223-224 (further characterizes and adds Montreal, Canada). Hine, 1904, Ohio Nat. 5 : 224 (adds Alberta). Kröber, 1926, Stett. Ent. Zeit. 87 : 211, 296-298 (Suggests affinities with *montanus* on basis of an apparently misidentified specimen and adds Massachusetts). Knowlton and Thatcher, 1933, Utah Horseflies, Unnumbered Cir.

Syn. *C. lupus* Whit. 1904, Can. Ent. 36 : 205, from Colorado. Cole and Lovett, 1921, Proc. Calif. Acad. Sci. 11 : 232 (adds Oregon; probably mis-determined, as specimens seen by the writer with same listed data and this label are *C. proclivis* without lateral spots on second abdominal segment). Hine, 1923, Can. Ent. 55 : 145 (adds Alaska). Philip, 1931, Minn. Bull. No. 80 (further characterizes, includes male and adds Minnesota, Wyoming and Montana).

Specimens examined: 2 ♂, 29 ♀, Montana (June 30 to July 29), 24 ♀ Colorado (June 24 to Sept. 3), 4 ♀ So. Dak., 1 ♀ Wyoming, 4 ♀ Minnesota, 2 ♀ Alberta, 1 ♀ Saskatchewan, 3 ♀ Quebec, 7 ♀ Ontario.

The late Professor Hine studied the type of *furcatus* at the British Museum and indicated the synonymy of *C. lupus* in manuscript notes together with comparison of specimens in his collection. The species is characterized by the black of the cheeks usually reaching the facial sutures, the abdomen with a geminate spot on the second segment, 4 black spots on the third and fourth segments, and the "cross-band" of the wing picture not reaching the posterior margin but extended across the base of cell Cu_1 , while the infuscation in cell R is interrupted by hyaline in the outer third to half. The fore coxae are almost always yellow, but in 2 dark specimens, shading to dark brown above and below.

Allotype ♂, 9½ mm. Except for the usual sexual differences, essentially like the ♀. Thoracic pile longer and deeper fulvous, and integument darker on the disc. Median abdominal spots geminate but not divided on the third to fifth segments, those on the first and second continuous, the latter subquadrate, only slightly indented with yellow behind. Lateral spots on the third and fourth segments present only as small, faint dashes, but large and connected with the median maculations on the fifth. The following segments black, narrowly emarginate with yellow. Apical spot of wings larger than in most females, the hyaline triangle not crossing vein R_{2+3} . Hamilton, Mont., in town. July 27, 1933, C. B. Philip.

Another ♂, Missoula, Mont., July 21, 1931. C. B. Philip. A little darker but essentially as above. Black of the face stops abruptly at the facial sutures in both specimens.

The eye pattern of the female has the occipital border contiguous with the margin, while the spots are separated from it. The shaft of the arrowhead is usually prolonged above, but

not joined to the border, although the latter is sometimes continuous with the upper spot. The arrowhead is joined to the median spot in about half of the specimens studied, including the 2 males.

The writer has specimens in which single characters approach *proclivis*, and similar specimens might explain the Saskatchewan records of the latter so far east of its usual Pacific Coast habitat. In 3 specimens, small spots are present on one or both sides of the second abdominal segment and in another rather dark insect (as well as the Quebec specimens seen in the American Museum), the facial infuscation has crossed the sutures broadly but irregularly and the lateral yellow triangles on segments 3 and 4 of the abdomen have been enclosed by the merging of the black to form isolated central spots; the wing picture is typical of *furcatus* in these variations. In another specimen, on the other hand, the black on the cheeks reaches only to the yellow pollinose stripes (the unusual character presented by Walker's type), and even less extensive in a specimen seen in the Museum of Comparative Zoology from California. Four specimens also seen in series at the latter institution were atypical *aestuans* but the species should not be confused if the wing patterns are checked in doubtful instances.

Chrysops proclivis, O. S.

1877, Bull. U. S. Geol. Surv. 3 : 222 from California. Williston, 1886, Trans. Kans. Acad. Sci. 10 : 134 (adds Washington and Oregon). Ricardo, 1901, Am. Mag. Nat. Hist. Ser. 7, VIII: 306. Hine, 1904, Can. Ent. 36 : 89 (adds British Columbia). Hine, 1905, Ohio Nat. 5 : 225 (further characterizes, includes male, and omits Colorado and Oregon which were listed in his 1904 catalogue and also British Columbia cited above), Cole and Lovett, 1921, Calif. Acad. Sci. 11 : 233. Cameron, 1926, Bull. Ent. Res. 17 : 24-25 (characterizes both sexes and immature stages, and adds Saskatchewan; the remarks and locality seem more likely for *furcatus*).

Syn. *C. atricornis* Bigot, 1892, Mem. Soc. Zool. Fr. 5 : 603 (I have a specimen compared with the type through the kindness of Major E. E. Austen).

Syn. *C. pachycera* Will. 1886 (male only), see Adams, 1904, Kans. Univ. Bull. 11.¹

var. *surdus*, O. S., 1877, Bull. U. S. Geol. Surv. 3 : 223, from California. Willis-

¹Since submission of this manuscript for publication, the writer has been permitted to study this male through the kindness of Dr. Beamer in charge of the University of Kansas collections, and disagrees with Adams in its assignment to *C. proclivis*. The specimen has yellow rather than black palpi, cell R of the wing is not completely infuscated but has a hyaline apical spot, the cross-band does not reach the posterior margin of the wing, the apical spot is too broad, the cheeks are yellow and fore coxae are brown, not black, and melanization on the second abdominal segment laterally occurs from the anterior (as in the following segments) and not the posterior margin. It is not *C. pachycera* but is unknown to the writer at present.

ton, 1886, Trans. Kans. Acad. 10 : 134 (cites variations and adds Washington). Hine, 1905, Ohio Nat. 5 : 226.

n. var. *imfurcatus*, n. var. *picus*, described below.

Specimens examined: 4 ♀ British Columbia (Aug. 10), 13 ♀ Washington (May 27 to Aug. 7), 17 ♀ Oregon (June 12 to July 23), 21 ♀ California (June 1 to July 17).

For separation from the preceding species, the completely black fore coxae and the characteristic wing pictures are the only reliable characters since they are least subject to variation, while the infuscation on the face and abdomen varies considerably in extent. The infuscated cell R is not crossed by hyaline, although the hind margin along vein M may be clear especially apically, the cross-band reaches the posterior margin in cell M_3 but does not cross cell Cu_1 , and the apical spot is somewhat narrower than in *furcatus*. In typical *proclivis* the infuscation on the cheeks is limited by the facial sutures, but may cross it in varying degrees, until the ferruginous interval is narrow and acuminate downward, the black coalescing below, in the varieties *surdus* and *picus*. Typically also, the species has an isolated spot on either side the median maculation on the second abdominal segment, but these spots not only vary in size but may be completely absent as discussed below; the median spot may be geminate, enclosing an acuminate or even a truncated yellow triangle or it may be subquadrate, narrowing posteriorly and without indentation in extremely dark specimens. The maculations on the third and fourth abdominal segments are usually (not always) completely divided by median yellow intervals, the lateral quadrate spots being slightly indented posteriorly, but not divided as in most *C. lupus*. The same remarks concerning the eye pattern of *C. furcatus* may be applied to this species. Size variable, 7 to 9.5 mm.

Besides the 4 female types for each of *proclivis* and *surdus*, intergrades from British Columbia and Washington were seen in the Museum of Comparative Zoology collections.

The writer agrees with those who feel that consideration of varieties of species of the Tabanidae is generally not advisable except where such procedure clarifies, rather than confuses, recognition of a widely variable species. *C. proclivis* is unfortunately such a species, the variations involving characters which are not so mutable in other species and which have been used by other workers for key purposes. Constant differences to separate into species the forms of *proclivis* are not at present available, and intergrades prevent continued specific retention of *surdus*, a doubt concerning which was also expressed by Kröber. For purposes of keying and recognition, however, it seems advisable not only to keep the name in a varietal capacity

but to record 2 other varieties which show unusual or confusing variation.

A few specimens have been studied, including those labeled *C. lupus* from Oregon listed by Cole and Lovett (1921), in which the second abdominal segment resembles *C. furcatus* in the lack of lateral spots, and the following variety is described to call attention to this possible confusion:

***Chrysops proclivis* var. *imfurcatus*, n. var.**

Face yellow between the sutures, antennae black, reddish on the inner side of the first segment. Thorax with disc black, covered sparsely with golden yellow hairs, pleural pile of the same color. Wing picture characteristic, except that the apical spot, starting about half the width of cell R_1 , widens rapidly to continue to the apex of the wing somewhat wider than that cell, and the cross-band, while abruptly limited by vein Cu_1 , fades just before reaching the posterior margin of the wing in cell M_3 . No trace of the lateral spots on the second abdominal segment, the median maculation emarginate behind with a yellow triangle about half the width of the segment. Third segment mostly black, with narrow dashes mesally and laterally which do not reach the anterior border; the following segments black with yellow incisures. Because of its large size, the lack of spots on the sides of the second tergite and the rather wide apical spot of the wing, it bears a remarkable superficial resemblance to *furcatus* but differs little in other respects from typical *proclivis*. Upper eye spot separated from both the margin and occipital border, median spot also isolated.

Type female, length 9 mm. Sumner, Washington (May 27, 1930), Randall Latta. *Paratype*, Coburg, Ore., Aug. 5, 1917 (Richter). Six other females from Wash. agree in size, wing and head characters but have very small spots on the second segment laterally. In the collection of the writer.

The writer also has a very small specimen representing such an extreme of melanization, as to have suggested it as new on first study:

***Chrysops proclivis* var. *piceus*, n. var.**

Wings with characteristic pattern of *proclivis*, the apical spot narrow and not widened distally to reach vein R_{2+3} except where it crosses that vein near the margin. The midfacial yellow, integumental stripe is reduced to a very narrow, yellow line reaching about two-thirds the distance to the margin of the mouth. Antennae yellowish basally but darker than in most *proclivis*. Disc of thorax black, unstriped, pleurae with the yellowish stripes much reduced and without the usual pronounced orange tint to the pleural pile. Abdomen black, the second tergite only showing faint indications of mesal emargination. Small yellow spots occupy the upper half of that segment laterally and project on to the posterior margin of the first segment, barely continuing beneath as yellow notches in the edges of the second sternite. Incisures of the second to fifth

tergites, and third to fifth sternites narrowly yellow pollinose, widest on the fourth. Venter otherwise black except for faint brownish shades on the second sternite. Legs black, the middle pair and the middle and hind tarsi basally with dark brownish shades. Eye pattern heavy, but not otherwise unusual for *proclivis*.

Type female, length 7 mm. Huntington Lake, California (July, 1917), I. McCracken. In the collection of the writer, through the kindness of Professor G. F. Ferris of Stanford University.

A large specimen from Requa, California, 9.5 mm. in length represents another extreme of variation, in which the apical spot widens (even greater than in var. *imfurcatus*) from a stem half the width of cell R, at the junction with the cross-band, to infuscate somewhat more than the distal half of vein R₄, the cross-band fades perceptibly before reaching the hind margin, and a brown streak occupies the full length of the hind margin of cell 2nd M occupying about one-fourth its width (nevertheless, cells R and Cu₁ are characteristic); the middorsal maculation on the first and second tergites is solid and continuous, narrowest behind. A few other specimens show completely yellowish first antennal segments or hind femora and the inferior margin of cell M₃ along vein Cu₁ may be hyaline. In only one specimen (from Tidewater, Oregon) is there a suggestion of a hyline spot completely crossing the apex of cell R.

Chrysops coloradensis Bigot (in part) 1892.

Mem. Soc. Zool. Fr. 5 : 605, from Colorado. Ricardo, 1901, Am. Mag. Nat. Hist. Ser. 7, VIII, 397. Hine, 1905, Ohio Nat. 5 : 220 (adds Washington and California). Cole and Lovett, 1921, Proc. Calif. Acad. Sci., 11 : 232 (add Oregon).

Specimens examined: 3 ♂, 6 ♀, California (July); 1 ♂, 2 ♀, Oregon (July 3 and July 23).

This species has a general resemblance to *furcatus*, but with the infuscation of the body and wings usually very much reduced or faded. In outline, the wing picture is almost identical, with more hyaline apically in cell R and the cross-band perhaps more widely separated from the posterior margin. The face and cheeks are yellow with black in the apodemal pits on either side, the frontal callosity of the female is yellow with a brown upper margin, and the abdominal pattern usually has all maculations divided, including the geminate spot of the second abdominal segment which is here divided anteriorly to form paired dashes. The lateral rows of spots may be so reduced as to be hardly discernible.

The eye pattern in 2 specimens studied is comparatively heavy. The occipital border and upper and lower spots are contiguous with the margin, and the arrowhead is joined to the border above and to the median spot in front.

Two pairs seen in the Hine collection from Topaz, California, and a male in the Oregon State College collection, although having the same build and wing pattern, differ in having paler yellow abdomens (the faded appearance of *discalis*) with coalescent spots, and narrow, black callosities in the females; they probably represent a different but closely related species, but additional material is needed to determine their status.

Chrysops luteopennis, n. sp.

Female, length 8 mm. Frontal callosity yellow with dark upper margin, resembling that of *C. coloradensis*. Abdomen yellow with middorsal row of geminate spots on the 2nd, 3rd, and 4th segments enclosing small yellow triangles; a row of elongate black spots on either side, starting at the middle of the 2nd segment, the yellow intervals giving these lateral spots the appearance of lines. Whole wing picture luteous, without the usual sharp contrast, although the cross-band and apical spot are darkest, while the hyaline triangle is pale smoky, almost hyaline; apical spot at base is a little wider than cell R_1 and gradually tapers to the tip of the wing, somewhat the appearance of that in *C. sackeni*.

Head with facial callosities yellow, bare in the middle but a slight downward evagination, mesally, of the pollinose area between the antennae, not seen in females of related species. Palpi and first antennal joints yellow, second joints of latter and base of third smoky, remainder black. Disc of *thorax* and scutellum black margined before and laterally above the antelar tubercles and bases of the wings with plumbeus and with sparse golden and grayish short hair. Pleurae plumbeus with a smoky stripe across the disc of the antelar calli. *Legs* yellow, the joints of the first and last pairs, the fore tibiae distally and the hind femora proximally, and all the tarsi (except base of last 2 pairs) infuscated. *Wings* with cell R luteofuscous (of same density as cross-band) and cell 2nd M pale luteous their full length, fading to a subhyaline area in either cell just before the fork of vein M. The cross-band plainly reaches the posterior margin in cell M_3 , is less dense in cell Cu_1 , but darkens again along the posterior margin of that cell. Halteres black. *Abdomen* with a black subquadrate spot on 1st segment merging with the semi-parallel sided, geminate spot on the 2nd segment enclosing a small equilateral triangle on the posterior margin. This margin and those following yellow, increasing in width caudally. Fifth and following segments black except for yellow margins, venter yellow, darkening toward the tip, with a median row of black triangles and two lateral black lines on the 2nd to 5th segments, inclusive.

Occipital border of *eye pattern* contiguous with margin but separating above, where it joins the shaft of the arrowhead and the upper spot, and below where a spur reaches forward and upward beyond the junction with the point of the arrowhead. Median and lower spots isolated from margin and arrowhead alike, the former smaller than usual.

Type, Moore's Lake, Anoka County, Minnesota, July 14, 1925, C. B. Philip. In the collection of the University of Minnesota.

Paratype, Sandusky, Ohio, June 22, 1899. In the collection of Ohio State Museum. Agrees in detail with the type except that the thoracic plumbeous stripes are more apparent, reaching almost the full length of the disc, and the dilute luteous shades of the usually hyaline areas of the wings are less dense.

Head characters relate this species to the more robust *coloradensis* and to *sackeni*, in both of which, however, cell R lacks complete infuscation and the luteous suffusion. It is more slender than most *furcatus*, lacking head characters of the latter and the abdominal pattern is darker. The lateral spots on the 2nd abdominal segment are more pronounced and elongate cephalad than in *proclivis* in addition to other obvious differences. I have seen no specimens of other species of the group in which the arrowhead of the eye pattern was connected both above and below to the occipital border as in this species.

Chrysops facialis, Towns.

1897, *Psyche* 8 : 251, female from "Gila River." Hine, 1904, *Ohio Nat.* 5: (further characterizes and adds male). Kröber, 1926, *Stett. Ent. Zeit.* 87 : 261-262 (adds New Mexico).

Specimens examined: 5 ♀, Arizona (April 4, June 25, and July), 1 ♀, Sierra Madre, Mexico.

This bears a striking superficial resemblance to *furcatus* but is nevertheless usually not associated with it on account of the moderately swollen basal antennal segments. The laterally narrowed black frontal callosity of the female has the shape of that in *fulvaster*; the extent of yellow on the disc varies in different specimens. The Mexican specimen in Hine's collection is unusually dark with the lateral abdominal spots extending forward on segment 3 and cell Cu_2 of the wing almost completely filled.

The purple maculations of the eye pattern are very heavy. The occipital border is completely divided at the mesal notch, but joined above to the upper spot. The upper and lower spots are separated from the eye margin and the shaft of the arrowhead does not reach the border above, while the median spot is continuous with the arrowhead.

ANALYTICAL KEY TO WESTERN SPECIES OF *Furcatus* GROUP.

1. First antennal joint moderately enlarged; face with a narrow median stripe of yellow pollen, widest below *facialis*, Towns.
- First antennal joint normal in size; middle of face without pollinose stripe, shining 2

- 2. Cheeks and face yellow, frontal callosity of female yellow with a narrow fuscous upper border3
- Cheeks and face black, yellow in the middle, frontal callosity of female black.....4
- 3. Wing picture and hyaline areas contrasting, cell R with one-fourth or more of the apex hyaline.....*coloradensis* Bigot
- Wings with luteofuscous pictures and luteous or subhyaline intervals, cell R infuscated to the apex.....*luteopennis* n. sp.
- 4. Fore coxae yellow, rarely with dark brownish streaks; cell R crossed by hyaline apically, the cross-band crosses Cell Cu₁ but does not reach posterior margin*furcatus* Walk.
- Fore coxae entirely jet black; cell R infuscated its entire length, cross-band extends down cell M₂ to margin but does not cross vein Cu₁.....*proclivis* O. S. (5)
- 5. Face narrowly yellow in the middle; a black spot present in the yellow on either side of the second abdominal segment; usually less than 8 mm.....6
- Face broadly yellow over practically the whole intersutural space; second abdominal segment without lateral spots; over 8 mm. in length.....*imfurcatus* n. var.
- 6. Abdomen black, lateral dark spots on the second segment merged with the median spot, leaving only a small yellow notch in front, black on following segments not indented behind although posterior margins are narrowly yellow.....*piceus* n. var.
- Abdomen with lateral spots on the second segment isolated, black on the third segment indented or divided in the middle....var. *surdus* O. S.

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THE TEXAS CITRUS MITE, A NEW SPECIES.

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During recent months the writer has received several consignments of a pytophagous mite from citrus in Texas. Critical study of the material has convinced the writer that it represents a new species, and it is therefore described below.